

# Service Manual

Radio  
**R-224R/W**

MW/SW 2-BAND PORTABLE RADIO



## ■ SPECIFICATIONS

Frequency Range: MW 525~1605 kHz (571~187m)  
SW 3.2~12 MHz  
(93.8~25m)...R-224W  
SW 4.75~18 MHz  
(63.2~16.7m)...R-224R

Intermediate Frequency: 455 kHz

Sensitivity: MW 50 $\mu$ V/m for 50mW Output  
SW 5 $\mu$ V/m for 50mW Output

Power Output: 500mW Maximum

Batteries: 3V (Two "D" Size Flashlight Batteries)  
(National UM-1 or equivalent)

Speaker: 6.5 cm (2½") PM Dynamic Speaker

Dimensions: 195(Wide) x 119(High) x 47(Deep) mm  
(7½" x 4½" x 1¾")

Weight: 550 g. (1 lb. 3.4 oz.) without batteries

Impedance: Speaker .....8 $\Omega$   
Earphone Jack .....8 $\Omega$

Specifications are subject to change without notice for further improvement.

 **National Panasonic**

Matsushita Electric Trading Co., Ltd.  
P.O. Box 288, Central Osaka, Japan

## ■ TO REMOVE CHASSIS

1. Remove cabinet cover screw, as illustrated in fig. 1.
2. Pull out connecting socket.
3. Remove three (3) red chassis screws, nos. 1~3, as illustrated in fig. 2.

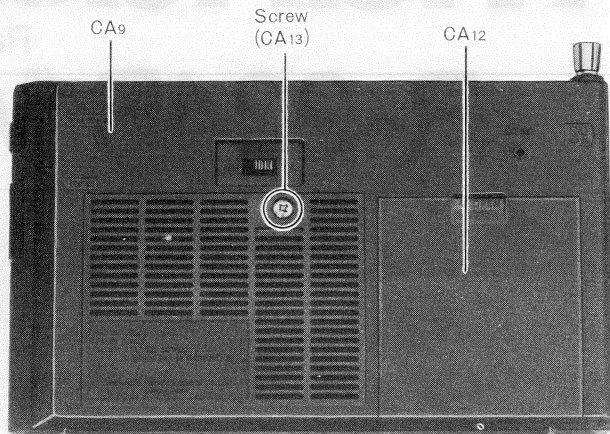


Fig. 1

4. To remove chassis completely, unsolder lead wire to speaker, battery terminals and tone switch.
5. To reassemble, reverse the above procedure.

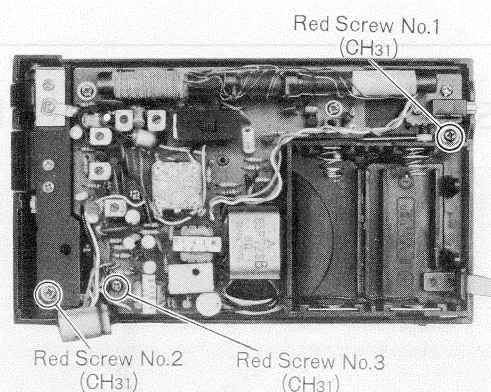


Fig. 2

## ■ DIAL CORD INSTALLATION GUIDE

1. Remove chassis from cabinet.
2. Dial cord length is 100 cm (39 3/8").
3. Turn dial drum to fully counter-clockwise.
4. Arrows (1~9) indicate correct order and direction of dial cord installation as illustrated in fig. 3.
5. Cement dial cord ends.

## ■ TO MOUNT DIAL DRUM & GEAR

1. Turn tuning gang to fully clockwise.
2. To mount dial gear.
3. Turn dial gear (Upper Side) to clockwise. (Fig. 4)
4. To mount dial drum. (Fig. 4)

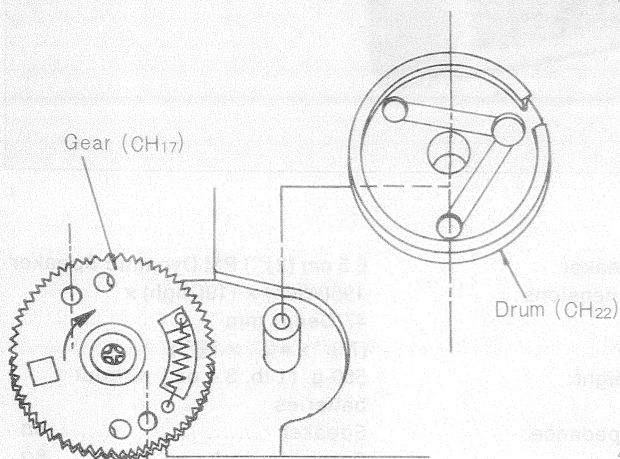


Fig. 4

## ■ TO MOUNT DIAL POINTER

1. Turn dial drum to fully clockwise.
2. Set dial pointer to start point of plastic chassis.
3. Attach dial cord to dial pointer.

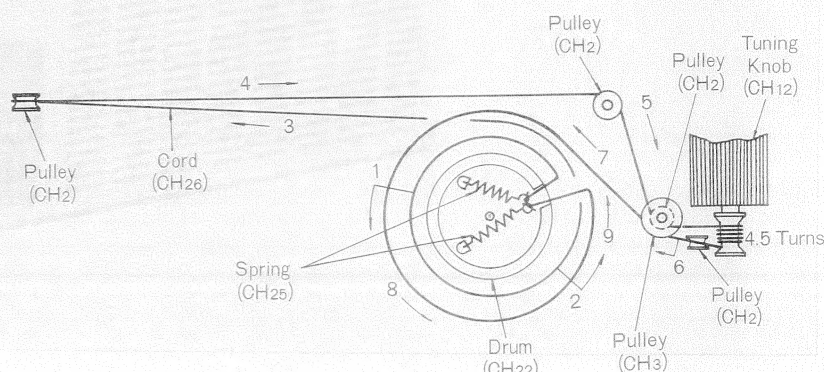
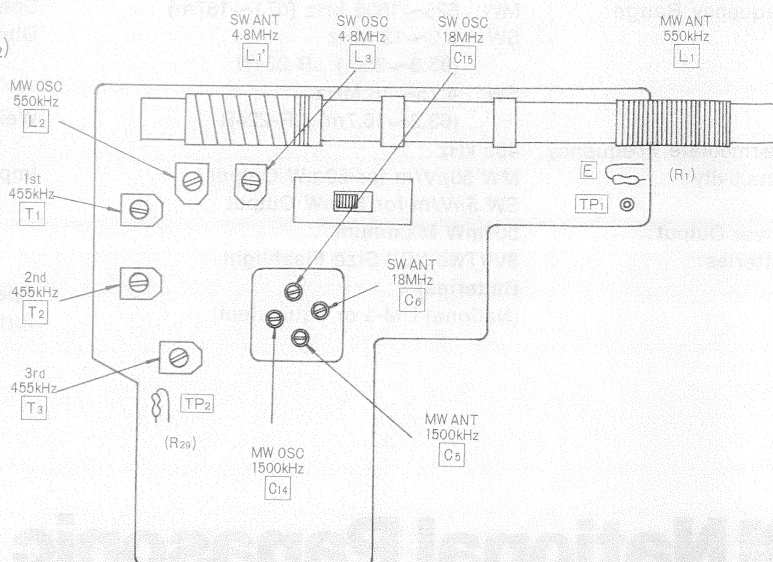


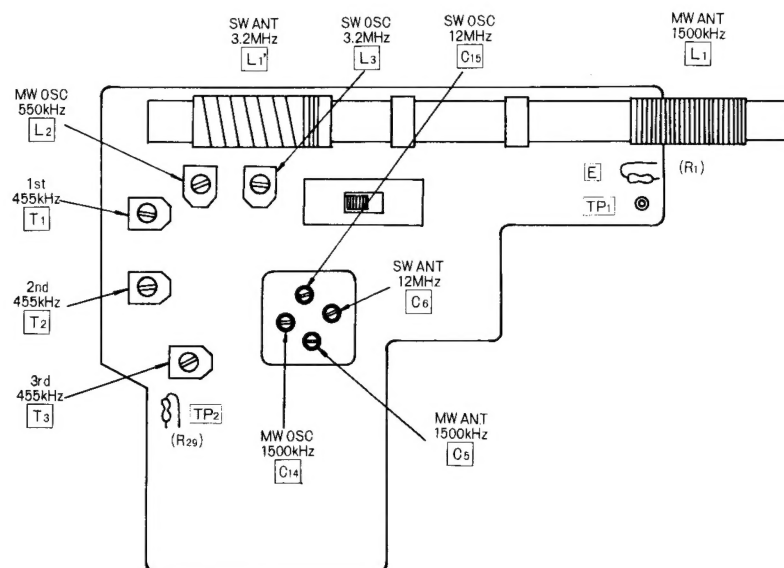
Fig. 3



Alignment Points (Model R-224R)

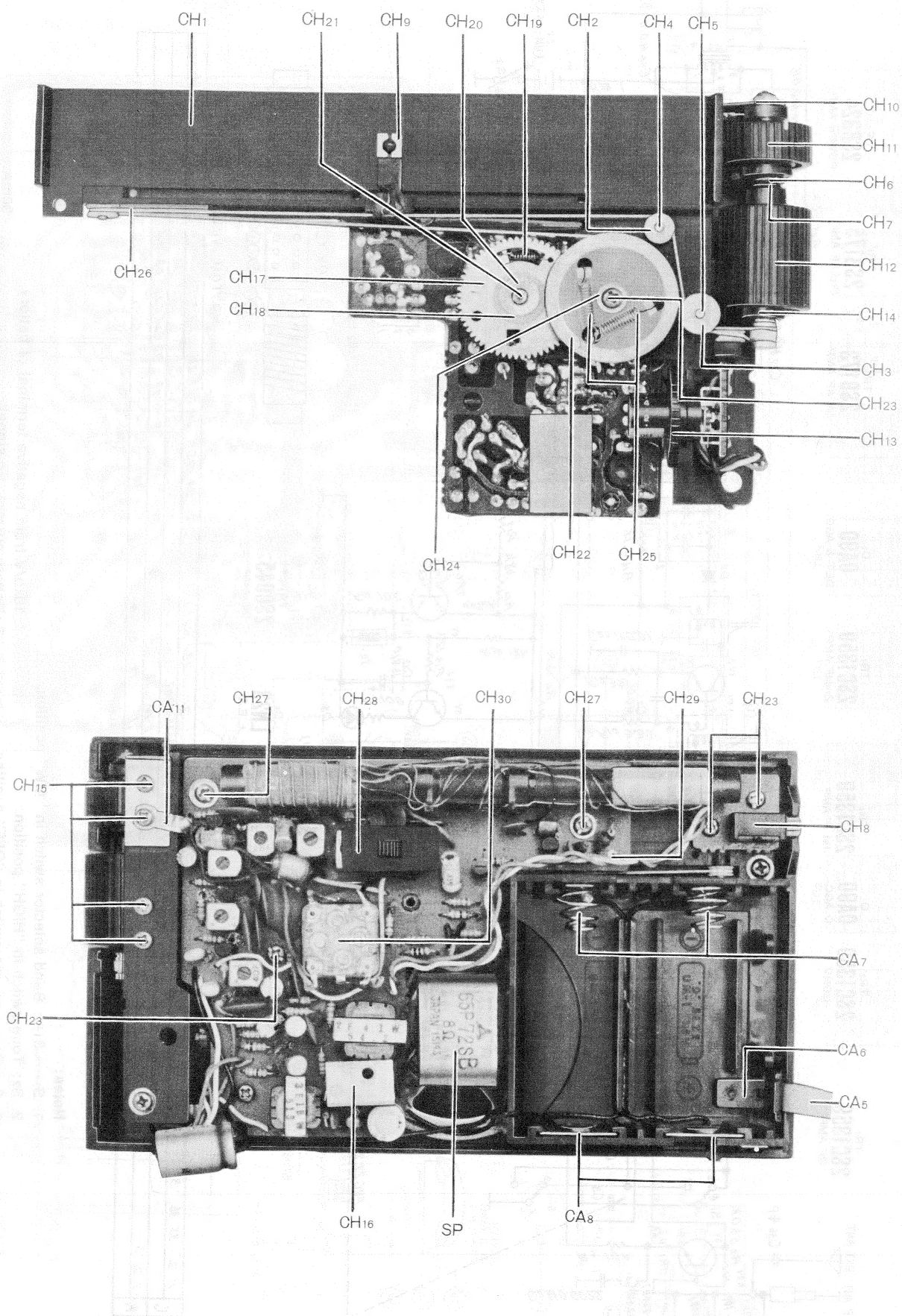
# ■ ALIGNMENT INSTRUCTIONS

READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT					
<b>Notes:</b> 1. Set volume control to minimum. 2. Set tone switch to high. 3. Set band selector switch to MW or SW.			4. Set fine tuning to center. 5. Set power source voltage to 3 volts DC. 6. Output of signal generator should be no higher than necessary to obtain an output reading.		
SIGNAL GENERATOR		RADIO DIAL SETTING [DISTANCE]	INDICATOR (VTVM or SCOPE)	ADJUSTMENT	REMARKS
CONNECTIONS	FREQUENCY				
MW ALIGNMENT					
Fashion loop of several turns of wire and radiate signal into loop of receiver.	455 kHz 30% Mod. with 400 Hz.	Point of non-interference. (on/about 600 kHz).	Output meter across earphone jack.	T <sub>1</sub> (1st IFT) T <sub>2</sub> (2nd IFT) T <sub>3</sub> (3rd IFT)	Adjust for maximum output.
"	550 kHz	550 kHz [8.93mm( $\frac{11}{32}$ " )]	"	L <sub>2</sub> (OSC Coil) (*) L <sub>1</sub> (ANT Coil)	Adjust for maximum output. Adjust L <sub>1</sub> by moving coil bobbin along ferrite core.
"	1500 kHz	1500 kHz [84.19mm( $3\frac{5}{16}$ " )]	"	C <sub>14</sub> (OSC Trimmer) C <sub>5</sub> (ANT Trimmer)	Adjust for maximum output. Repeat steps (2) and (3).
SW ALIGNMENT (R-224R)					
Connect ceramic capacitor (7pF) between TP <sub>1</sub> and earth.	4.8 MHz	4.8MHz [2.8mm( $\frac{1}{8}$ " )]	"	L <sub>3</sub> (OSC Coil) (*) L <sub>1</sub> ' (ANT Coil)	Adjust for maximum output. Adjust L <sub>1</sub> ' by moving coil bobbin along ferrite core.
"	18 MHz	18 MHz [91.2mm( $3\frac{11}{32}$ " )]	"	C <sub>15</sub> (OSC Trimmer) C <sub>6</sub> (ANT Trimmer)	Adjust for maximum output. Repeat steps (4) and (5).
(*) Cement antenna bobbin with wax after completing alignment.					
SW ALIGNMENT (R-224W)					
Connect ceramic capacitor (7pF) between TP <sub>1</sub> and earth.	3.2 MHz	3.2 MHz [2.61mm( $\frac{1}{16}$ " )]	"	L <sub>3</sub> (OSC Coil) (*) L <sub>1</sub> ' (ANT Coil)	Adjust for maximum output. Adjust L <sub>1</sub> ' by moving coil bobbin along ferrite core.
"	12 MHz	12 MHz [90.87mm( $3\frac{19}{32}$ " )]	"	C <sub>15</sub> (OSC Trimmer) C <sub>6</sub> (ANT Trimmer)	Adjust for maximum output. Repeat steps (6) and (7).
(*) Cement antenna bobbin with wax after completing alignment.					

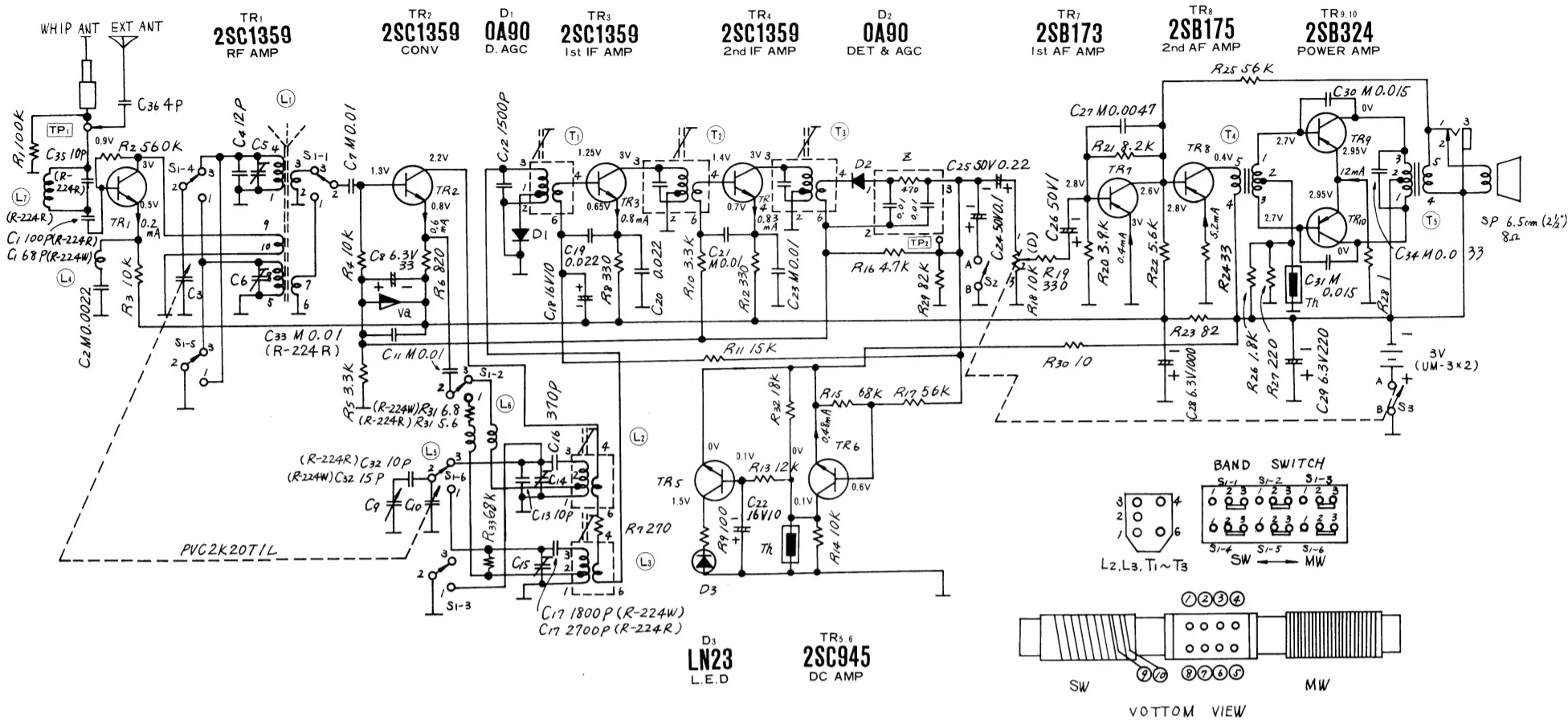


Alignment Points (Model R-224W)

# ■ CHASSIS PARTS LOCATIONS



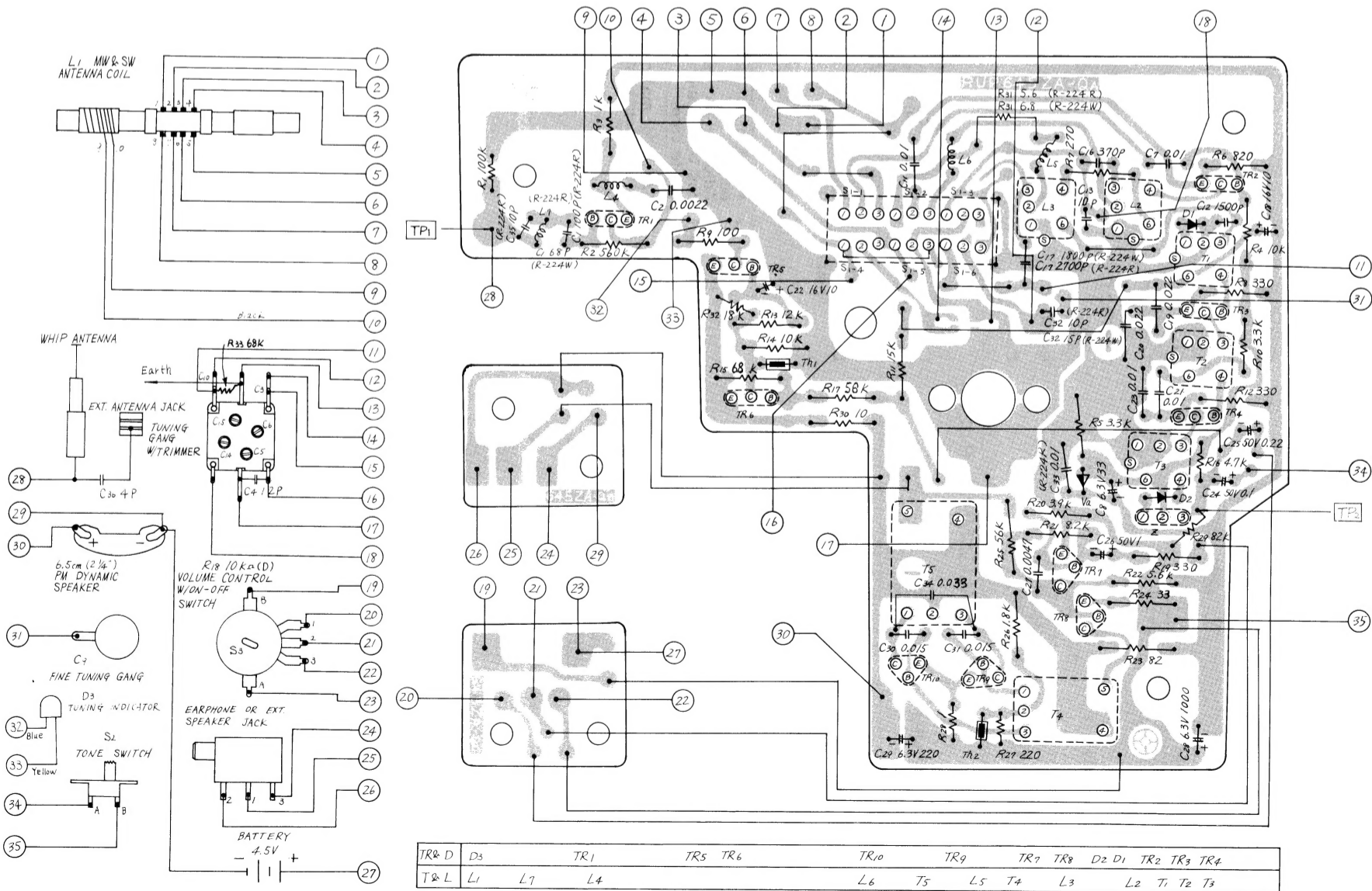
Schematic Diagram – Model R-224R/W



Notes:

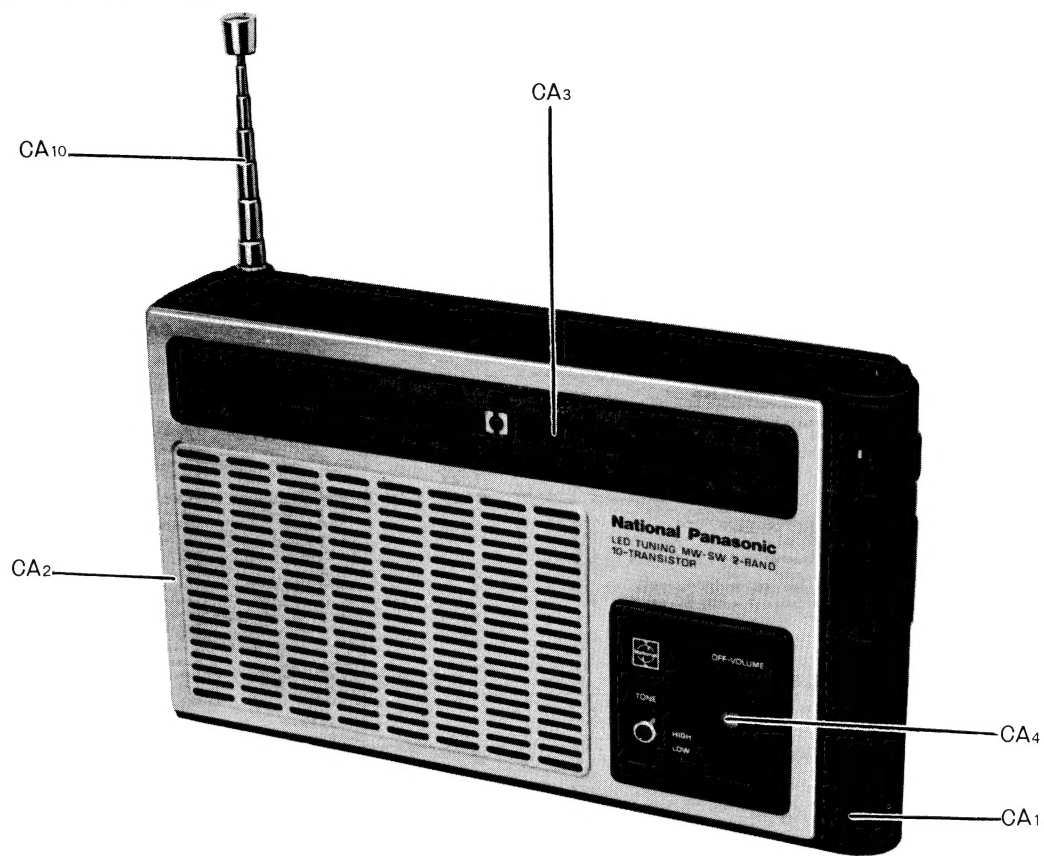
- 1. S<sub>1</sub>~S<sub>6</sub>: Band selector switch in "MW" position.
- 2. S<sub>2</sub>: Tone switch in "HIGH" position.
- 3. S<sub>3</sub>: Power source switch in "OFF" position.
- 4. DC voltage measurements are taken with circuit tester
- 5. Battery current: No signal ..... 30mA  
Maximum output .....320mA

Circuit Board Wiring View – Model R-224R/W

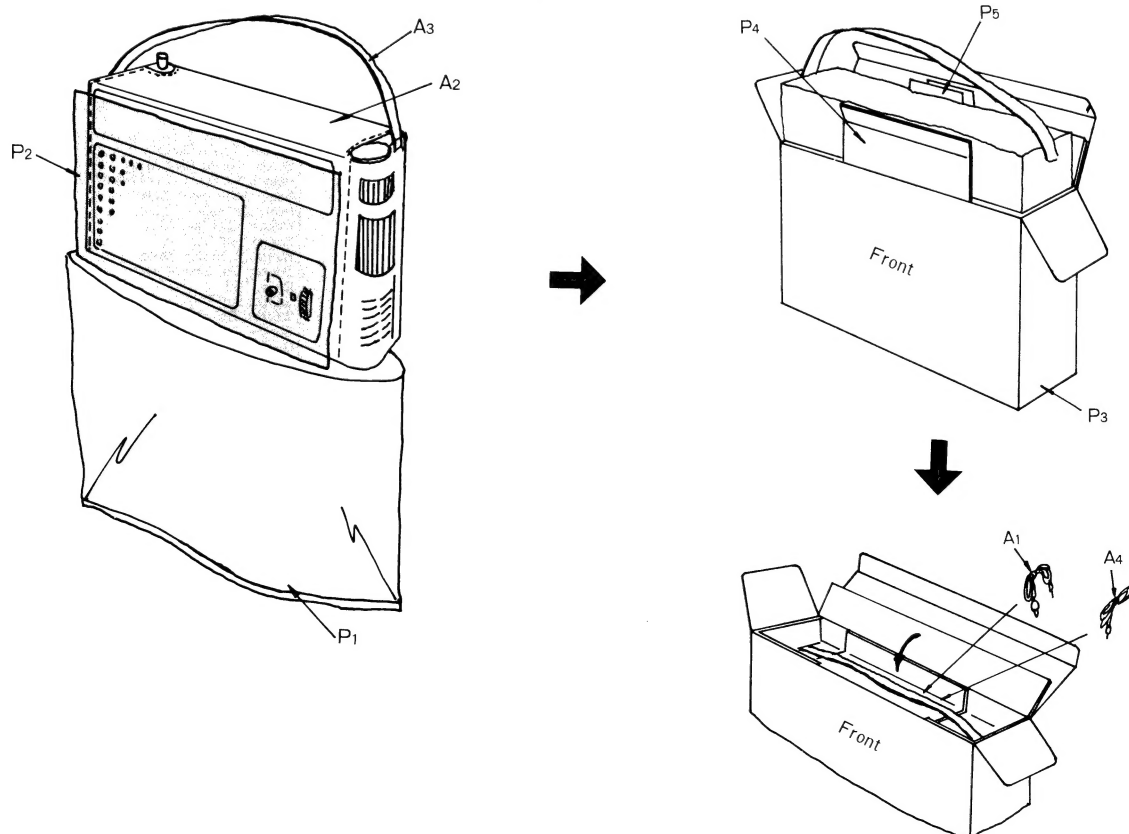


TR <sub>1</sub>	TR <sub>2</sub>	TR <sub>3</sub>	TR <sub>4</sub>	TR <sub>5</sub>	TR <sub>6</sub>	TR <sub>7</sub>	TR <sub>8</sub>	TR <sub>9,10</sub>
C 3 V	C 2.2V	C 3 V	C 3 V	C 1.5V	C 0.1V	C 2.6V	C 0.4V	C 0 V
B 0.9V	B 1.3V	B 1.25V	B 1.4V	B 0.1V	B 0.6V	B 2.8V	B 2.7V	B 2.95V
E 0.5V	E 0.8V	E 0.65V	E 0.7V	E 0 V	E 0 V	E 3 V	E 2.8V	E 2.95V
I <sub>E</sub> 0.2mA	I <sub>E</sub> 0.6mA	I <sub>E</sub> 0.8mA	I <sub>E</sub> 0.83mA	I <sub>E</sub> 0.48mA	I <sub>E</sub> 0.48mA	I <sub>E</sub> 0.4mA	I <sub>E</sub> 5.2mA	I <sub>E</sub> 12mA

## ■ CABINET PARTS LOCATIONS



## ■ ACCESSORIES & PACKING PARTS LOCATIONS



## REPLACEMENT PARTS LIST

**NOTES:**  
 1. Part numbers are indicated on most mechanical parts.  
 Please use this part number for parts orders.  
 2. X—Z rank: X rank parts will cover 80% of repair needs.  
 X+Y rank parts will cover 95% of repair needs.  
 Z rank parts are less necessary.

Ref.No.	Part No.	Description	Per Set	Remarks
<b>TRANSISTORS AND DIODES</b>				
TR1,2,3,4	2SC1359	RF Amplifier, Converter, 1st & 2nd IF Amplifier	4	X
TR5,6	2SC945	DC Amplifier	2	X
TR7	2SB173	1st AF Amplifier	1	X
TR8	2SB175	2nd AF Amplifier	1	X
TR9,10	2SB324	Power Amplifier	2	X
D1,2	0A90	AM D, AGC, AM DET & AGC	2	X
D3	LN23	L. E. D.	1	X
<b>VARIATITE AND THERMISTORS</b>				
Va	EYV320D1R2J3	Variatite	1	X
Th1	RRT251	Thermistor	1	X
Th2	RRT103	Thermistor	1	X
<b>COILS AND TRANSFORMERS</b>				
L1	RLF5E41-0	MW/SW Antenna Coil(R-224R)	1	X ○
L1	RLF5E42-0	MW/SW Antenna Coil(R-224W)	1	X ○
L2	RL02M6	MW Oscillator Coil	1	Y
L3	RL03M16-M	SW Oscillator Coil(R-224R)	1	Y
L3	RL03M27-M	SW Oscillator Coil(R-224W)	1	Y
L4,6	RLQY10G5	Choke Coil	1	Y
L5	RLQY50S5	Choke Coil	1	Y
L7	RLQY75S5	Choke Coil(R-224R Only)	1	Y
T1	RL12M203	1st IF Transformer	1	X
T2	RL12M205	2nd IF Transformer	1	X
T3	RL12M402	3rd IF Transformer	1	X
T4	RLT3E18-W	Input Transformer, P=700Ω: S=1KΩ	1	X ○
T5	RLT2F41-W	Output Transformer, P=30Ω: S=8Ω	1	X
<b>VARIABLE RESISTOR</b>				
R18	EVL-D8B852D14	10KΩ (D), Volume Control, W/ON-OFF Switch(S3)	1	X ○
<b>VARIABLE CAPACITORS</b>				
C3,10	PVC2K20T1L	Variable Capacitors, W/Trimmer (C5,6,14,15)	1	X
C9	RCVMVC1B	Fine Tuning Gang	1	X
<b>COMPONENT COMBINATION</b>				
Z1	EXAF203Z471R	0.01μF × 2, 470Ω	1	Y
<b>SPEAKER</b>				
SP	EAS65P72SB	6.5cm(2½") PM Dynamic Speaker, Imp.8Ω	1	X
<b>SWITCHES</b>				
S1-1~S1-6	RSS70A	Band Selector Switch	1	X
S2	RSS63A	Tone Switch	1	X
<b>RESISTORS</b>				
R30	ERD18TJ100	10Ω, ½Watt, ±5%, Carbon	1	Z
R24	ERD18TJ330	33Ω, ½Watt, ±5%, Carbon	1	Z
R23	ERD18TJ820	82Ω, ½Watt, ±5%, Carbon	1	Z
R9	ERD18TJ101	100Ω, ½Watt, ±5%, Carbon	1	Z
R7	ERD18TJ271	270Ω, ½Watt, ±5%, Carbon	1	Z
R8,12,19	ERD18TJ331	330Ω, ½Watt, ±5%, Carbon	3	Z
R6	ERD18TJ821	820Ω, ½Watt, ±5%, Carbon	1	Z
R3	ERD18TJ102	1KΩ, ½Watt, ±5%, Carbon	1	Z
R26	ERD18TJ182	1.8KΩ, ½Watt, ±5%, Carbon	1	Z
R5,10	ERD18TJ332	3.3KΩ, ½Watt, ±5%, Carbon	2	Z
R20	ERD18TJ392	3.9KΩ, ½Watt, ±5%, Carbon	1	Z
R22	ERD18TJ562	5.6KΩ, ½Watt, ±5%, Carbon	1	Z
R21	ERD18TJ822	8.2KΩ, ½Watt, ±5%, Carbon	1	Z
R4,14	ERD18TJ103	10KΩ, ½Watt, ±5%, Carbon	2	Z
R13	ERD18TJ123	12KΩ, ½Watt, ±5%, Carbon	1	Z
R11	ERD18TJ153	15KΩ, ½Watt, ±5%, Carbon	1	Z
R17,25	ERD18TJ563	56KΩ, ½Watt, ±5%, Carbon	2	Z
R15,33	ERD18TJ683	68KΩ, ½Watt, ±5%, Carbon	2	Z
R1	ERD18TJ104	100KΩ, ½Watt, ±5%, Carbon	1	Z
R2	ERD18TJ564	560KΩ, ½Watt, ±5%, Carbon	1	Z
R27	ERD18VJ221	220Ω, ½Watt, ±5%, Carbon	1	Z
R16	ERD18VJ472	4.7KΩ, ½Watt, ±5%, Carbon	1	Z
R29	ERD18VJ823	82KΩ, ½Watt, ±5%, Carbon	1	Z
R28	ERX1ANJ1R0	1Ω, 1Watt, ±5%, Wire	1	Z
R31	ERD18TJ6R8	6.8Ω, ½Watt, ±5%, Carbon(R-224W)	1	Z
R31	ERD18TJ5R6	5.6Ω, ½Watt, ±5%, Carbon(R-224R)	1	Z
R32	ERD18VJ183	18KΩ, ½Watt, ±5%, Carbon	1	Z
<b>CAPACITORS</b>				
C36	ECCD1H040C0	4PF, 50WV, ±0.25PF, Ceramic	1	Z
C13	ECCD1H100KC	10PF, 50WV, ±10%, Ceramic	1	Z
C35	ECCD1H100KC	10PF, 50WV, ±10%, Ceramic (R-224R Only)	1	Z
C32	ECCD1H100KC	10PF, 50WV, ±10%, Ceramic (R-224R)	1	Z
C32	ECCD1H150KC	15PF, 50WV, ±10%, Ceramic (R-224W)	1	Z
C4	ECCD1H120KC	12PF, 50WV, ±10%, Ceramic	1	Z
C1	ECCD1H101K	100PF, 50WV, ±10%, Ceramic	1	Z
C1	ECMS05680KH	68PF, 50WV, ±10%, Ceramic (R-224R)	1	Z
C2	ECCKE1H222MD	0.0022μF, 50WV, ±20%, Ceramic	1	Z
C27	ECCKE1H472MD	0.0047μF, 50WV, ±20%, Ceramic	1	Z
C7,21,23	ECCKE1H103MD	0.01μF, 50WV, ±20%, Ceramic	3	Z

Ref.No.	Part No.	Description	Per Set	Remarks
C33	ECCKE1H223MD	0.022μF, 50WV, ±20%, Ceramic	1	Z
C19,20	ECCKE1H223PF	0.022μF, 50WV, ±100%, Ceramic	2	Z
C16	ECQS1371JZ	370PF, 125WV, ±5%, Styrol	1	Z
C12	ECQS05152KZ-T	1500PF, 50WV, ±10%, Styrol	1	Z
C17	ECQS05272KZ-T	2700PF, 50WV, ±10%, Styrol (R-224R)	1	Z
C17	ECQS05182JZ	1800PF, 50WV, ±10%, Styrol (R-224W)	1	Z
C11	UFDD10YR103M	0.01μF, 25WV, ±20%, Ceramic	1	Z
C30,31	ECFD1E153MD-D	0.015μF, 25WV, ±20%, Ceramic	2	Z
C8	ECCEA6V33	33μF, 6.3WV, Electrolytic	1	Y
C29	ECCEA6V220	220μF, 6.3WV, Electrolytic	1	Y
C28	ECCEA6V1000	1000μF, 6.3WV, Electrolytic	1	Y
C18,22	ECCEA6V10	10μF, 16WV, Electrolytic	2	Y
C26	ECCEA50V1	1μF, 50WV, Electrolytic	1	Y
C24	ECCEA50ZR1	0.1μF, 50WV, Electrolytic	1	Y
C25	ECCEA50ZR22	0.22μF, 50WV, Electrolytic	1	Y
C34	ECQG05333MZ-T	0.033μF, 50WV, ±20%, Polyester	1	Z
<b>CABINET</b>				
CA1	RYMR224RX	Cabinet Body Assembly(R-224R)	1	X ○
	RYMR224WX	Cabinet Body Assembly(R-224W)	1	X ○
	(Not Available Order, RYMR224RX or RYMR224WX)	Cabinet Body Only	(1)	
CA2		Nylon Net	(1)	
CA3		Metal Grille	(1)	
CA4		Panel, Dial(R-224R)	(1)	
CA5		Panel, Dial(R-224W)	(1)	
CA6	RQP345Z	Panel, Indicator	1	Y ○
CA7	RHS44	Spring, Battery	1	Z
CA8	RHP903	Paper, Battery Tape	1	Z
	RJC502Z	Spring, Battery (Side)	2	Y
	RJC102-4	Terminal, Battery (Side)	2	Y
	XTN23+6B	Screw, Tone Switch M'tg	2	Y
	XTW3+8E	Screw, Speaker Bracket M'tg	2	Z
	RMS30	Bracket, Speaker	1	Z
CA9	RYFR224RX	Cabinet Back Cover Assembly(R-224R)	1	X ○
	RYFR224WX	Cabinet Back Cover Assembly(R-224W)	1	X ○
	(Not Available Order, RYFR224RX or RYFR224WX)	Cabinet Back Cover Only	(1)	
CA10		Nylon Net	(1)	
	RGT462Z	Name Plate(R-224W Only)	1	Z ○
	XEARV104HBSY	Whip Antenna	1	X
	XS3B+12BNS	Screw, Whip Antenna M'tg	1	Z
	XWC3B	Washer, Whip Antenna M'tg	1	Z
CA11	RJS71Z	Socket, E.X.T. Antenna	1	Y
	RJT202B	Terminal, Whip Antenna & Earth	2	Y
CA12	RJ119Z-G	Connecting Socket, Whip Antenna	1	Y
	RKK61A-X	Battery Cover	1	X
CA13	RUV58B	Cover, Tone Switch	1	Z
	XTB3+35BFN	Screw, Cabinet Back Cover M'tg	1	Z
<b>CHASSIS</b>				
CH1	RXE1R224RX	Dial Chassis Assembly	1	X ○
CH2		Dial Chassis Only	(1)	
CH3	(Not Available Order, RXE1R224RX)	Pulley, Dial	(4)	
CH4		Pulley, Dial	(1)	
CH5		Shaft, Pulley	(3)	
		Shaft, Pulley	(1)	
CH6	RXE2R224RX	Tuning Knob Bracket Assembly	1	X ○
CH7	(Not Available Order, RXE2R224RX)	Bracket, Tuning Knob	(1)	
CH8		Spacer, Tuning Knob	(1)	
CH9	RDP701Z	Jack, Earphone & EXT. Speaker	1	Y
CH10	RM74Z	Pointer, Dial	1	X ○
CH11	RB784Z	Bracket, Fine Tuning Gang	1	Y ○
CH12	RB783Z	Knob, Fine Tuning	1	Y ○
CH13	RBV15Z	Knob, Tuning	1	Y ○
	XYN2+C6	Knob, Volume	1	Y ○
CH14	RUT19Z	Screw, Fine Tuning Knob M'tg	1	Z
CH15	XYN3+C6S	Bracket, Tuning Knob	1	Z ○
	RHG5A	Screw, Tuning & Fine Tuning Knob M'tg	4	Z
	XSS26+6	Rubber, Tuning Gang	1	Z
CH16	RMV54-1	Screw, Tuning Gang M'tg	2	Z
	RDG605-2	Heat Sink, Transistor(TR9 & TR10)	1	Z
CH17	RDG7-2	Gear, Dial (Lower Side)	1	Y
CH18	RNW821	Gear, Dial (Upper Side)	1	Y
CH19	RUS80	Washer, Dial Gear M'tg	1	Z
CH20	XWG3X10	Spring, Dial Gear	1	Z
CH21	XYN26+C6	Screw, Dial Gear M'tg	1	Z
CH22	RDD305Z	Washer, Dial Gear M'tg	1	Z
CH23	XTN3+6B	Drum, Dial	1	Y ○
CH24	XW63	Screw, Dial Drum & P.C.B M'tg	4	Z
CH25	RDS3060A	Screw, Dial Drum M'tg	1	Y
CH26	RDZ05A	Spring, Dial Drum	2	Z
CH27	XTW3+8E	Cord, Dial(500m)	1	Z
	XTN3+8B	Screw, P.C.B M'tg	2	Z
CH28	RUV292-1	Screw, P.C.B M'tg	2	Z
CH29	RJP85Z	Cover, Band Selector Switch	1	Z
		Connecting Plug, Whip Antenna & Fine Tuning	2	Y
CH30	RMC208A	Shield, VARIABLE CAPACITOR	1	Z
CH31	XTW3+10ER	Red Screw, Chassis M'tg	3	Z
<b>ACCESSORIES</b>				
A1	XEH1A1-P	Magnetic Earphone, 8Ω	1	Y
A2	ROK60Z	Shoulder Case(Complete)	1	Y ○
A3	(Not Available Order, ROK60Z)	Shoulder Case Only	(1)	
A4	RJP44	Belt	(1)	Y
		EXT. Antenna with Plug	1	
<b>PACKING</b>				
P1	RPP164Z	Polyethylene Cover	1	Z ○
P2	RPH256ZA	Soft Sheet	1	Z ○
P3	RPK9217Z	Gift Box Complete	1	Z ○
P4	(Not Available Order, RPK9217Z)	Gift Box Only	(1)	
P5	RQX5788Z	Pad	(1)	Y ○
		Instruction Book	1	